REMARKS

In accordance with the foregoing, the specification has been amended. Claims 1-13 are pending and under consideration.

/I/ Specification Amendments

(1) At page 25, line 4; and page 81, line 1, each occurrence of "polystyrene-polyethylene/poly<u>butyrene</u>-polystyrene" has been corrected to --polystyrene-polyethylene/poly<u>butylene</u>-polystyrene--. This is merely a correction of a typographical error.

(2) At page 25, line 15, the description "organic porous material (c)" has been corrected to --inorganic porous material (c)--. This is a correction of an inadvertent error which occurred at the time of the translation into English of the original Japanese PCT specification.

(3) At page 39, line 20, the description "a cycloalkylene group or a bicycloalkylene group" has been corrected to --a cycloalkene group or a bicycloalkene group--. This is merely a correction of an inadvertent error which occurred at the time of the translation into English of the original Japanese PCT specification.

(4) At page 73, line 9, the description "a nozzle <u>of</u> a die" has been corrected to --a nozzle <u>or</u> a die--. This amendment is merely a correction of an inadvertent error which occurred at the time of the translation into English of the original Japanese PCT specification.

(5) At page 119, Table 2, column 2, row 9, the term "<u>buthoxy</u> <u>ethylene</u> glycol methacrylate" has been corrected to --<u>butoxy</u> <u>diethylene</u> glycol methacrylate--. This is merely a correction of an inadvertent error which occurred at the time of the translation into English of the original Japanese PCT specification.

In support of the above-mentioned amendments (2) to (5), the Applicants attach hereto a DECLARATION ("Declaration 1") to verify that the amendments are made only to correct inadvertent errors which occurred at the time of the translation into English of the original Japanese PCT specification

(6) At page 115, line 12 and page 116, line 15 of the present specification, the description "average pore diameter" has been changed to —average particle diameter--. This amendment is merely a correction of an inadvertent error which occurred at the time of the translation into English of the original PCT specification.

In support of the above-mentioned amendment (6), Applicants attach hereto a DECLARATION ("Declaration 2") to verify that the amendment is made to correct an inadvertent

error which occurred at the time of the translation into English of the original Japanese PCT specification.

From the above, it is apparent that instant proposed amendment does not raise any new matter or any new issue problem.

/II/ Double Patenting

Claims 1, 2, 4, 8 and 9-13 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1, 2 and 4-12 of U.S. Patent No. 7,029,825.

Response is made as follows.

The Applicants submit herewith a terminal disclaimer.

/III/ Introduction

Before specifically discussing the rejection of the claims, it is believed that the following background information should be considered in order to shed a proper light on the development of the present invention and the advantageous features thereof. As discussed in the present specification under "Prior Art", the production of a flexographic printing plate using a photosensitive resin has conventionally been performed by a photolithographic method which uses a photomask. For easy understanding of the Examiner, the steps involved in the photolithographic method are illustrated in the following Fig. I.

Fig. I

Photolithographic Method

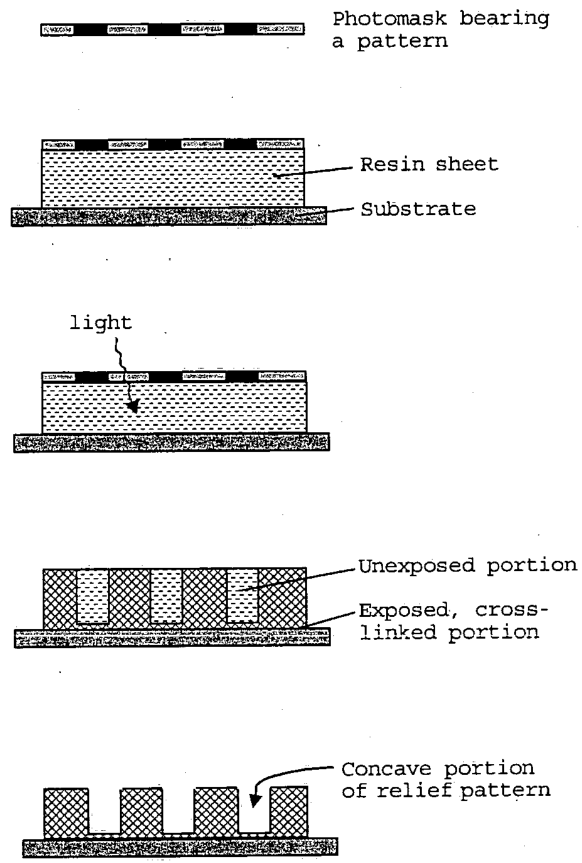
a) Preparing a photomask bearing a pattern;

b) Placing the photo-mask bearing a pattern on a resin sheet (obtained by molding a resin into a sheet);

c) Image-wise exposing the resultant masked resin to light, to thereby crosslink the exposed portions of the resin;

d) Removing the photomask from the resin; and

e) Subjecting the exposed resin to a developing treatment for removing the unexposed portions of the resin (i.e., uncrosslinked resin portions) with a developing liquid.



As apparent from Fig. I above, the photolithographic method used for forming a flexographic printing plate comprises the steps of: a) Preparing a photomask bearing a pattern; b) placing the photomask bearing a pattern on a liquid resin or a solid resin sheet (obtained by molding a resin into a sheet); c) image-wise exposing the resultant masked resin to light, to thereby crosslink the exposed portions of the resin; d) removing the photomask from the resin; and subjecting the exposed resin to a developing treatment in which the unexposed portions of the resin (i.e., uncrosslinked resin portions) are washed away with a developing liquid. This method requires a developing treatment and, hence, the efficiency for producing the printing plates is low. Therefore, it has been desired to develop a method for forming a relief pattern directly on a printing element by using a laser <u>without a need for a developing treatment</u> (see page 2, line 25 to page 4, line 10 of the present specification).

As an example of such a method, there can be mentioned a laser engraving method in which a printing element is engraved directly with a laser to form a relief pattern. For easy understanding of the Examiner, the steps involved in the laser engraving method are illustrated in the following Fig. II.

Fig. II

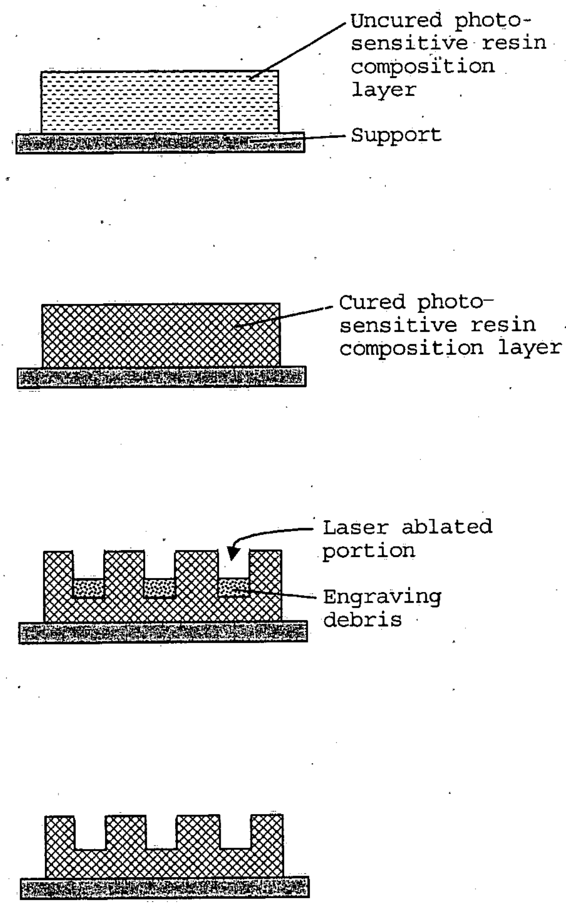
Laser engraving method

(i) Forming a photosensitive resin composition layer on a support;

(ii) Crosslink-curing the photosensitive composition layer by light or electron beam irradiation to cure the resin composition layer; thereby obtaining a printing element;

(iii) Engraving a pattern on the cured photosensitive resin composition layer of the printing element by laser beam irradiation, thereby forming a relief pattern on the cured resin composition layer;

(iii') Followed by washing and/or wiping to remove the engraving debris.



As apparent from Fig. II above, the laser engraving method comprises the steps of: (i) forming a photosensitive resin composition layer on a support; (ii) crosslink-curing the photosensitive resin composition layer by light or electron beam irradiation to cure the resin composition layer, thereby obtaining a printing element; and (iii) irradiating a portion of the cured resin composition layer with a laser beam to ablate and remove the irradiated portion of the cured resin composition layer, thereby forming a relief pattern on the cured resin composition

layer (see claim 12 of the present application). The resultant printing element is used as an image-bearing printing plate.

Although this method does not need a cumbersome developing treatment, laser engraving of a conventional printing element has been accompanied by several problems. For example, when a printing element is formed from a reinforced elastomer material, laser engraving results in a large amount of viscous liquid debris (which is presumed to be a laser decomposition product of the resin) which is difficult to remove. The generation of such debris not only necessitates a time-consuming treatment for removing the debris, but also causes problems, such as an imprecise boundary between elastomer portions which have been melted by laser beam irradiation and unmolten elastomer portions which form the relief pattern, the swelling of the edges of the unmolten elastomer portions forming the relief pattern, the adherence of the molten elastomer to the surfaces and/or sides of the unmolten elastomer portions forming the relief pattern, and the destruction of portions of the relief pattern which correspond to the dots of a print obtained using the relief pattern. Further, when a large amount of liquid debris is generated during the laser engraving of the printing element, the liquid debris stains the optical parts of a laser engraving apparatus. The liquid debris adhered to the surface of optical parts, such as a lens and a mirror, causes serious troubles of the apparatus, such as burnout of the apparatus (see page 8, line 9 to page 9, line 9 of the present specification).

In this situation, the present inventors have made extensive and intensive studies with a view toward developing a photosensitive resin composition which is suitable as a material for forming a printing element used for producing an image-bearing printing plate by laser engraving. As a result, it has surprisingly been found that, when a printing element is formed from a <u>specific resin composition</u> which comprises a <u>photosensitive resin</u> (which is easily decomposed by laser beam irradiation) and an <u>inorganic porous material</u> (which is used for absorption removal of viscous liquid debris generated in a large amount due to the use of the easily decomposable resin), the formed printing element generates only a <u>small</u> amount of debris during the laser engraving of the printing element. The present invention has been completed, based on this novel finding.

<u>/III/ 35 USC § 103</u>

1. Claims 1-5 and 8-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takemiya et al., U.S. Patent No. 6,372,351 B1 in view of Kakishita et al., U.S. Patent No. 6,387,594 B1. Specifically, the Examiner states as follows.

"Takemiya teaches a resin composition comprising an epoxy resin, a non-conductive carbon and an inorganic filler (col. 2, lines 44-47). The epoxy resin, acrylic resins and fluorine resins meet the limitations of thermoplastic and solvent-soluble resins. Table 1, example 1 discloses the epoxy resins in an amount of 100 parts by weight and an arylalkyl phenolic resin in an amount of 87 parts by weight in the composition. The molecular weights of the resins used are conventional and meet the limitations of instant claim 1. The composition further comprises a coupling agent (organic compound) such as vinylethoxysilane and meets the limitations of a polymerizable unsaturated group per molecule and molecular weight as in instant claim 1. The organic filler may comprise powders of fused silica, alumina and zirconia. The inorganic filler may also comprise a spherical particle shape (col. 9, lines 15-28). The composition may comprise a non-conductive carbon material (carbon black covered with an insulating, inorganic material such as silica) and having an average particle diameter of 0.3 to 5μm (col. 8, line 59), surface area of 130 m^2/g or smaller, and a DBP oil absorption of 120 cm^3/100 g (120 ml/100 g) or less (col. 10, lines 34-40). Since the average particle diameter and surface area meet the limitations of the inorganic material, it would be expected that the average pore diameter and pore volume would be optimized. The epoxy composition may be molded, cured and exposed to laser marking in electronic devices (col. 10, lines 55-64). Takemiya does not teach the process of forming a relief printing element with the resin composition. However, Kakishita teaches a plate making film comprising a substrate, a hydrophilic, transparent film layer and a polymeric layer. The transparent film layer (elastomeric layer) comprises a photosensitive polyurethane resin. The polyurethane resin is in a liquid state at room temperature, subsequently becoming a plastic film after heating (col. 11, lines 45-60). The resin is coated onto a transparent plastic substrate, which is representative of a sheet composition. The resin is then irradiated to crosslink the polymeric compound in the resin, which is representative of photocuring as in instant claim 9 (col. 6, lines 17-22 and 61-65).... The resin composition was exposed, washed with water and exposed again. This process removes selected areas of the resin that are not used to form a letterpress. The composition has a Shore hardness of 60 degrees (col. 12, lines 25-45). The laser exposure is a form of heating and therefore meets the limitations of instant claim 13. It would have been obvious to one of ordinary skill in the art to combine the product of Takemiya with the process of Kakishita because Kakishita teaches the plate making process comprising a photosensitive resin as conventional." (emphasis added)

Traverse is made as follows.

The Examiner seems to misunderstand that Takemiya et al. disclose the resin composition of the present invention and that Kakishita et al. disclose a method for producing a

laser engraved printing element. As explained in detail below, the present invention is not obvious over Takemiya et al. in view of Kakishita et al.

(1) Takemiya et al.

Takemiya et al. disclose an epoxy resin composition comprising an epoxy resin, a curing agent, a non-conductive carbon and an inorganic filler which is used for forming packages for an electronic device. The Examiner seems to misunderstand that the epoxy resin, the curing agent and the non-conductive carbon used in Takemiya et al. respectively correspond to the resin (a), the organic compound (b) and the inorganic porous material (c) used in the present invention.

The resin composition of the present invention comprises:

(a) a resin which is in a solid state at 20 °C and which has a number average molecular weight of from 5,000 to 300,000,

(b) an organic compound having a number average molecular weight of less than 5,000 and having at least one polymerizable unsaturated group per molecule, and

(c) an inorganic porous material having an average pore diameter of from 1 nm to 1,000 nm, a pore volume of from 0.1 ml/g to 10 ml/g and a number average particle diameter of not more than 10 μm.

In the present invention, the resin (a) and the organic compound (b) are used in combination to obtain an excellent photosensitive resin composition. Specifically, the organic compound (b) is used for improving the curing properties of the resin. When a photosensitive resin composition is produced using only a resin (a) having relatively high molecular weight, it becomes difficult to cure such a resin composition and obtain a cured resin having excellent properties. However, the combination of a resin (a) having a high molecular weight and an organic compound (b) having a low molecular weight is effective for producing a resin composition which exhibits excellent mechanical properties after cured (see page 36, lines 2-25 of the present specification).

On the other hand, the coupling agent used in Takemiya et al. is an agent for improving the affinity of inorganic filler with the epoxy resin (see col.9, lines 38-41 of Takemiya et al.) Therefore, the coupling agent is completely different from the organic compound (b) of the present invention which is used for improving the curing properties of resin (a). Moreover, the resin composition of Takemiya et al. is not a photosensitive (photocurable) resin composition. Specifically, in the working examples of Takemiya et al., the molded resin compositions are cured by heating at 180 °C for 90 seconds, followed by post-curing at 175 °C (see col. 13, lines

60-67 of Takemiya et al.) Therefore, the epoxy resin composition of Takemiya et al. is a heat curable resin composition.

Further, in the present invention, use of an inorganic porous material (c) having a specific average pore diameter, a specific pore volume and a specific particle diameter is critical for the absorption removal of viscous liquid debris generated during the laser engraving of the printing element. The criticality of using a specific inorganic porous material is apparent from the comparison between Example 1 and Comparative Examples 4 and 5 of the present specification.

In Example 1 of the present specification, a photosensitive resin composition was produced in accordance with the formulation shown in Table 1 of the present specification. Specifically, porous microparticulate silica product (trade name: SYLOSPHERE C-1504) was used as the inorganic porous material (c). The produced photosensitive resin composition was shaped into a sheet and photocured to thereby obtain a printing element. The obtained printing element was subjected to laser engraving for forming a relief pattern, thereby obtaining a printing plate. On the other hand, in each of Comparative Examples 4 and 5, a printing plate was produced in substantially the same manner as in Example 1 except that a substantially nonporous material was used instead of the inorganic porous material (c).

The properties of the inorganic porous material used in Example 1 and the nonporous materials used in Comparative Examples 4 and 5 are summarized in the following Table A, together with the properties defined in claim 1 of the present application.

Table A

	Inorganic material			
	Name (trade name)	Average pore diameter	Pore volume	Average particle diameter
Claim 1	---	1 to 1000 nm	0.1 to 10 ml/g	not more than 10 μm
Example 1	Silica product (Sylosphere C-1504)	12 nm	1.5 ml/g	4.5 μm
Comparative Example 4	Aluminosilicate (Silton AMT25)	---	0.006 ml/g	2.9 μm
Comparative Example 5	Sodium calcium aluminosilicate (Silton JC50)	---	0.02 ml/g	5.0 μm

Each of the produced printing plates was evaluated by the methods described at page 96, line 12 to page 99, line 2 of the present specification. The results of the evaluation are summarized in the following Table B.

Table B

	Frequency of wiping needed to remove the debris (BEMCOT impregnated with ethanol)	Tack on the relief printing plate after wiping (N/m)
Example 1	≤ 3	55
Comparative Example 4	**10 <**	**350**
Comparative Example 5	**10 <**	**280**

As can be seen from Table B above, when a printing plate was made of a photosensitive resin composition containing an inorganic porous material having an average pore diameter, a pore volume and a number average particle diameter within the specific ranges defined in claim 1 of the present specification (Example 1), the frequency of wiping needed to remove the engraving debris was not more than 3 times and the tack on the printing plate after wiping was as small as 55 N/m. On the other hand, when a printing plate was made of a photosensitive resin composition containing substantially non-porous inorganic material (Comparative Examples 4 and 5), even after wiping the printing plate more than 10 times to remove the engraving debris, the tack on the printing plate was 280 N/m or more.

As apparent from the above, the use of a photosensitive resin composition containing an inorganic porous material which simultaneously has an average pore diameter of from 1 nm to 1,000 nm, a pore volume of from 0.1 ml/g to 10 ml/g and a number average particle diameter of not more than 10 μm is critical for suppressing the generation of liquid debris during the laser engraving of a printing element and lowering the amount of surface tack.

In the outstanding Office Action, the Examiner states that the composition of Takemiya et al. comprise a non-conductive carbon material "having an average particle diameter of 0.3 to 5 μm, surface area of 130 m^2/g or smaller, and a DBP oil absorption of 120 $cm^3/100$ g (120 ml/100 g) or less". However, Takemiya et al. have no description about the surface area and the DBP oil absorption of the non-conductive carbon. Specifically, the surface area and the DBP oil absorption cited in the Office Action are values for conductive particles, such as carbon black, which are used as other additive (see col.10, lines 34-41 of Takemiya et al.) This is also apparent from the description found at col.13, lines 31-50 of Takemiya et al. which describes the properties of the non-conductive carbons and carbon blacks used in the working examples. Only an average particle diameter is described for each non-conductive carbon used, and only a

specific surface area and a DBP oil absorption are described for each carbon black used. As apparent from the above, Takemiya et al. have no teaching or suggestion about a porous non-conductive carbon.

In this connection, it should be noted that carbon black is not an inorganic porous material according to the present invention. As descried at page 54, line 24 to page 55, line 9 of the present specification, carbon black generally has a graphite structure and when the specific porosity of carbon black is calculated using the density of graphite (2.25 g/cm^3), the specific porosity of carbon black is in the range of from 0.8 to 1.0, which indicates that carbon black is a non-porous material.

Further, the Examiner seems to misunderstand also that the filler used in Takemiya et al. also corresponds to the inorganic porous material used in the present invention. Although the filler used in Takemiya et al. is an inorganic material, there is no description about the average pore diameter, the pore volume and the number average particle diameter of the filler. Since the filler is used for improving strength (see col.9, lines 7-9 of Takemiya et al.), a non-porous material having higher strength than a porous material are likely to be used in Takemiya et al.

From the above, it is apparent that the photosensitive resin composition comprising a resin, an inorganic compound and an inorganic porous material is not obvious over Takemiya et al. which have no teaching or suggestion about a photosensitive resin composition containing an inorganic porous material having a specific average pore diameter, a specific pore volume and a specific number average particle diameter.

(2) Kakishita et al.

Kakishita et al. disclose a method for forming a printing plate which comprises the steps of: a) producing a plate making film comprising a plastic substrate and a surface layer made of a specific polymeric compound, followed by drawing an image on the surface layer of the plate making film; b) bringing the drawn plate making film into intimate contact with a photosensitive member; c) exposing the photosensitive member through the plate making film; d) stripping the plate making film from the photosensitive member; and e) developing the photosensitive member (see claim 1 of Kakishita et al.) This method is the same as the conventional photolithographic method shown in Fig. I above.

The Examiner seems to misunderstand that the plate making film of Kakishita et al. corresponds to the multi-layered printing element of the present invention, and that the transparent film layer of the plate making film is made of a photosensitive polyurethane resin. The plate making film of Kakishita et al. corresponds to a photomask used in the conventional

photolithographic method (see steps a)-c) of Fig. I above), and the transparent film layer is a part of the photomask which is made of a polyethylene terephthalate film. Further, in Kakishita et al., the polyurethane resin is used as a photosensitive member which corresponds to a resin sheet used in the conventional photolithographic method for forming a relief pattern thereon (see steps b) to e) of Fig. I above). This is apparent from the descriptions found at col.11, lines 56-59; col.12, lines 2-12 and Example 1 of Kakishita et al. which clearly demonstrate that the image drawn transparent plastic film was used as a photomask (exposure mask) (i.e., step a) of Fig. I) and was attached to a conventional photosensitive polyurethane resin for making a letterpress printing, followed by light exposure through the mask using a metal halide lamp. Further, after removing the photomask, the photosensitive resin is subjected to a developing treatment, namely a treatment with a rinsing solution by a publicly known method.

In this method, the polyurethane resin is exposed to a metal halide lamp for photocuring the exposed portions of the resin and unexposed portions are removed by the developing treatment. Therefore, Kakishita et al. have no teaching or suggestion about the method for producing a laser engraved printing element of the present invention in which a relief pattern is formed by a laser engraving method.

Since the polyurethane resin layer of Kakishita et al. corresponds to the resin layer for forming a relief pattern, Kakishita et al. have no description about the elastomer layer used in the present invention which is a cushion layer. Therefore, Kakishita et al. have no teaching or suggestion about the multi-layered, laser engravable printing element of the present invention which comprises a printing element layer and an elastomer layer.

Further, the Examiner misunderstands that the exposure of the polyurethane resin to a metal halide lamp, namely the photocuring process of Kakishita et al., is one mode of the heating defined in claim 13 of the present application. In the present invention, the photosensitive resin composition is cured by <u>light or electron beam irradiation</u> and, then, the cured resin composition is <u>engraved using laser</u> (see items (ii) and (iii) of claim 12 of the present application). The heating defined in claim 13 of the present application is a process which is performed together with the laser exposure for <u>ablating</u> the desired portions of the cured photosensitive resin composition. When laser engraving of a printing element is performed while heating the printing element, the heating facilitates the decomposition of the resin by laser beam irradiation (see page 91, line 2 to page 92, line 3 of the present specification). As apparent from the above, Kakishita et al. also have no teaching or suggestion about the heating process defined in claim 13 of the present application.

(3) Combination of Takemiya et al. and Kakishita et al.

When the method of Kakishita et al. is performed using the resin composition of Takemiya et al., the resin sheet for forming a relief pattern by the photolithographic method is formed using the resin composition of Takemiya et al. Since the resin composition of Takemiya et al. is a heat curable resin, a relief pattern cannot be formed by exposing the resin composition of Takemiya et al. to light irradiation through the plate making film. Further, the inorganic particles (such as non-conductive particles, carbon black and fillers used in Takemiya et al.) are likely to absorb or scatter light and, therefore, a resin composition containing inorganic particles is disadvantageous for forming a precise image by a photolithographic method, namely the method of Kakishita et al.

As apparent from the above, the photosensitive resin composition, the laser engraving printing element and the laser engraved printing plate of the present invention are not obvious over Takemiya et al. in view of Kakishita et al. which have no teaching or suggestion about laser engraving method for forming a printing plate and the use of inorganic porous materials for the absorption removal of laser engraving debris.

2. Claims 1, 3, 4 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mori et al., U.S. Patent No. 6,399,270 B1.

> "Mori teaches a printing plate comprising inorganic porous particles, a plastic resin (col. 11, lines 57-64) and an organic compound (col. 43, line 39). The inorganic porous particles may comprise an average particle size (diameter) of no more than 1 μm, a pore volume of not less than 0.5 ml/g (col. 3, lines 1-8). Since the inorganic particles meet the limitations of pore volume and particle size (diameter), it is expected that the average pore diameter would also meet the limitation of instant claim 1. The plastic resin may comprise thermally fusible materials, such as novolac and acryl resins that have a softening point of 50 to 200 °C (col. 13, line 54 and col. 14, line 15). The molecular weights of the resins used are conventional and are present in an amount of 20 to 80 % by weight of the photosensitive layer (col. 46, lines 37-38). The plastic resins in the printing plate may further comprise a solvent-soluble resin, such as a polyimide resin (col. 11, line 57). The organic compound has a molecular weight of 400 to 1,000 and is present in an amount of 5 to 70 % of the photosensitive layer, therefore is present at least in an amount equivalent to 5 to 200 parts by weight of the resin (col. 44, line 51-56). The organic compound also meets the limitations of instant claim 4. The printing plate is exposed to infrared laser and developed (col. 48, lines 23-36)." (emphasis added)

Traverse is made as follows.

The Examiner seems to misunderstand that Mori et al. describe a photosensitive resin composition comprising a plastic resin, an organic compound and inorganic porous particles and a printing element formed from the photosensitive resin composition. As explained in detail below, Mori et al. have no teaching or suggestion about the photosensitive resin composition of the present invention.

The plastic resin described at col.11, lines 57-64 of Mori et al. is the resin used for forming a film used as a substrate and the polyimide resin is an example of the substrate (see col.11, lines 30 and 57-59 of Mori et al.) On the other hand, the thermally fusible material is not contained in the substrate, but contained in the image recording layer (see col.12, lines 53-54 of Mori et al.) The substrate and the image recording layer described in Mori et al. respectively correspond to the support and the photosensitive resin composition layer of the present invention. Therefore, the Examiner seems to be confusing the substrate and the image recording layer of Mori et al.

The organic compound described at col.43, line 39 of Mori et al. is an acid decomposing compound contained in the photosensitive image recording layer. The acid decomposing compound is used for increasing the solubility of the photosensitive image recording layer in a developer after irradiation.

Further, the inorganic porous particles are contained in a component layer provided between the substrate and the image recording layer. The component layer is provided to improve the properties of the substrate of the printing element and it is not a layer used for forming a laser engraved pattern. The inorganic porous particles in the component layer are used to enhance water-receptivity of the substrate to thereby prevent staining at the time of printing (see col.6, lines 63-67 of Mori et al.) and to strengthen the component layer (see col.9, lines 15-18 of Mori et al.)

As apparent from the above, the printing element of Mori et al. is a laminate containing a resin, an organic compound and an inorganic porous material in separate layers of the laminate.

In this connection, it should be noted that the printing element of Mori et al. has an image recording layer containing a thermally fusible material and an acid decomposing compound, and the image recording layer can be a photosensitive or thermosensitive resin layer which is provided separately from the component layer (see col.22, line 61 to col.23, line 7 of Mori et al.). However, the image recording layer described in Mori et al. is also completely different from the

photosensitive resin composition layer of the laser engravable printing element of the present invention.

Mori et al. have a negative teaching as to the use of a laser engraving method for forming a flexographic image. Specifically, the following descriptions are found in Mori et al.

> "However, any type thereof employs laser ablation whereby a layer provided on the substrate is removed, producing problems such as stains occurring in the exposure apparatus. There has been proposed an exposure apparatus in which a suction type cleaner was provided to prevent such staining. However, it was difficult to completely remove ablated substances." (see col.2, lines 34-41 of Mori et al.)

> "Accordingly, it is another object of the invention is to provide a printing plate which is handlable in room light, image formation can be made without need of ablation and therefore without causing any stains in the exposure apparatus, ..." (see col.2, lines 50-54 of Mori et al.)

As apparent from the descriptions above, Mori et al. describe the problems accompanying the generation of liquid debris during laser engraving (ablation), but these problems are solved by producing a flexographic image without performing laser engraving. In Mori et al., an image-bearing printing plate is formed by coating a photosensitive resin on a substrate to form an image recording layer, exposing the formed image recording layer to a light source (preferably a laser) to fuse the thermally fusible materials (i.e., photosensitive resin), and removing the soluble portions by development treatment (for example, by using a solvent which is capable of dissolving a binder fixing a thermally fusible material), thereby forming an image (see col.21, line 61 to col.22, line 6; and col.22, line 62 to col.23, line 7 of Mori et al.) This method is substantially the same as the conventional photolithographic method shown in Fig. I above, except that laser beam irradiation is used for curing the resin.

On the other hand, the photosensitive resin composition of the present invention is a mixture of a resin (a), an organic compound (b) and an inorganic porous material (c), and the photosensitive resin composition layer of the printing element is formed by curing the photosensitive resin composition. In the present invention, a relief pattern is formed by laser engraving the cured resin composition and the generation of the laser engraving debris is suppressed by the absorption removal of the debris by the inorganic porous material in the photosensitive resin composition.

From the above, it is apparent that the photosensitive resin composition comprising a resin, an inorganic compound and an inorganic porous material and the laser engravable

printing element which is obtained by curing the same are not obvious over Mori et al. which have no teaching or suggestion about a photosensitive resin composition containing an inorganic porous material and about the absorption-removal of laser engraving debris by the inorganic porous material.

3. Claims 1, 2, 5, 6 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takemiya et al., U.S. Patent No. 6,372,351 B1 as applied to claim 1 above, in view of Watanabe et al., U.S. Patent Publication No. 2002/0045126 A1 and further in view of Mohri et al., U.S. Patent No. 5,851,649.

> "Takemiya teaches an epoxy resin composition comprising an epoxy resin, a non-conductive carbon and an inorganic filler (col. 2, lines 44-47). Takemiya does not teach the sphericity of the silica particles or polyhedral particles. However, Watanabe teaches a photocurable composition comprising spherical silica particles. The spherical silica particles have a sphericity of 0.95 or more (page 5, [0056]). Watanabe also teaches the spherical silica particles may also comprise an average particle diameter of 1-50 μm. Therefore, it would have been obvious to one of ordinary skill in the art to use particles having a sphericity amount as claimed because Watanabe shows the sphericity amounts as conventional in photosensitive resins. Watanabe does not teach polyhedral particles. However, Mohri teaches inorganic porous particles, such as polyhedral crystals with a pore size distribution of smallest (10 %) to largest (90 %) sphere in the polyhedral particle (D_{10}/D_{90}) is no more than 3 (abstract). According to figure 3 in the Mohri reference, the pore volume distribution is at 100 % when the pore diameter of the particle is approximately 5-10 nm (0.005-0.010 μm). Therefore, it would have been obvious to one of ordinary skill in the art that the polyhedral particles having a D_{10}/D_{90} ratio of 3 would be expected to have a D_3/D_4 ratio of 1 to 3 because the values are based on pore volume distribution and diameter." (emphasis added)

Traverse is made as follows.

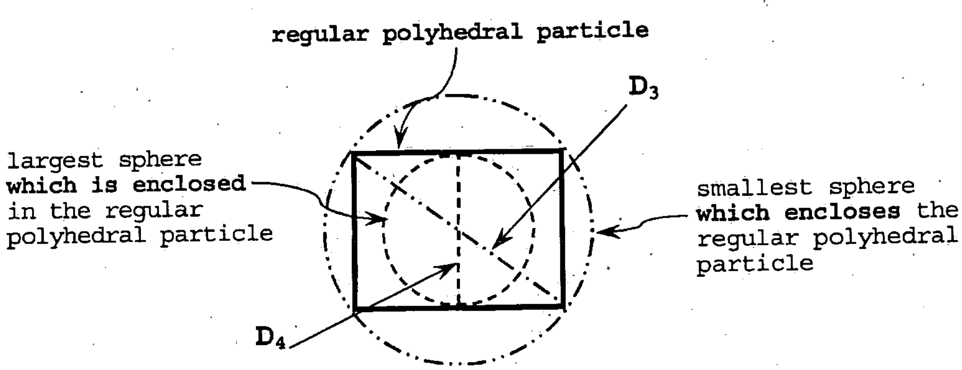
The Examiner seems to misunderstand that spherical porous particles and the polyhedral porous particles are described in Watanabe et al. and Mohri et al., respectively. As explained in detail below, both Watanabe et al. and Mohri et al. have no teaching or suggestion about inorganic porous particles and the absorption removal of laser engraving debris by the inorganic porous particles.

Watanabe et al. describe a photocurable resin composition containing spherical silica particles which is for producing a resin-based mold by a photo-fabricating method. In the invention of Watanabe et al., the spherical silica particles are used as a filler for improving the mechanical characteristics, heat resistance of the cured product and the durability of the resin-

based mold formed from the cured product (see paragraphs [0050] to [0051] of Watanabe et al.) Watanabe et al. have no description about the average pore diameter and the pore volume of the spherical silica particles. Further, the resin composition of Watanabe et al. is used only for forming shaped articles and, therefore, this document has no teaching or suggestion about a printing element made of the resin composition and the laser engraving of the cured resin composition. Further, Watanabe et al. have no teaching or suggestion about the absorption removal of laser engraving debris by the inorganic porous material.

Mohri et al. disclose an alumina porous sintered body or filter comprising alumina polyhedral particles which is obtained by molding the inorganic particles or packing the inorganic particles into a container, followed by calcination. The Examiner seems to misunderstand that Mohri et al. describe the pore size distribution of the inorganic particles used. The pore size distribution described in Mohri et al. is the pore size distribution of the sintered body or filter, namely the packed body of inorganic particles. Specifically, the pores of a sintered body are voids between the particles and Mohri et al. have no description about the pores of the inorganic particles forming the porous sintered body.

Further, the Examiner seems to misunderstand that the D_{10}/D_{90} ratio described in Mohri et al. is substantially the same as the D_3/D_4 value used in the present invention. The D values described in Mohri et al. are based on the pore volume distribution and pore diameter of the sintered body; however, the D_3 and D_4 values of the present invention are based on the particle diameter of the inorganic porous material. For easy understanding of the Examiner, the particle diameters D_3 and D_4 of a regular polyhedral particle are illustrated in the following diagram.



As described in claim 7 of the present application, D_3 represents the diameter of a smallest sphere (shown in -··-) which encloses the regular polyhedral particle therein and D_4 represents the diameter of a largest sphere (shown in ------) which is enclosed in the regular

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FEE

☒ The requisite disclaimer fee under 37 C.F.R. §1.20(d) of $130.00 should be charged to Staas & Halsey LLP Deposit Account No. 19-3935.

STAAS & HALSEY LLP

Dated: Aug 21 2006

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CERTIFICATE UNDER 37 CFR 1.8(a)
I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450
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